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A compartment for powder coating of workpieces.

The invention relates to a compartment for powder coating workpieces as defined in the preamble of claim 1.

Such compartments have been known and used for a long time. The interior of the compartments is limited by sidewalls, end walls at both ends, a compartment floor, and a compartment roof which is divided by a longitudinal gap. Usually the workpieces are moved through this longitudinal gap by means of a conveyor. To permit such conveyance, the compartment has an aperture for workpieces at least in its upstream end wall. Often a manual coating station is provided next to the compartment at the side thereof and adjacent the upstream end wall. There is an opening in the sidewall of the compartment that belongs to this manual coating station. Through the opening an operator can prime areas of the workpiece which are difficult to coat or need a prime coat by manipulating a hand spray gun inside the compartment and upstream of the automatic coating, in conveying direction of the workpieces. If desired or required, a second manual coating station is provided, likewise laterally of the compartment, downstream of the automatic coating of the workpieces, in conveying direction of the workpieces. Any insufficiently coated and/or complicated areas of the workpieces thus may be recoated manually, as needed, inside the compartment by a person acting from this other manual coating station.

The free space is limited when manipulating the hand spray guns since the manual coating must be accomplished in the interior of the compartment through openings in the compartment.

During the coating operation powder particles may escape to the outside through the rather great openings at the manual coating stations, causing harm to the environment and loss of powder. This disadvantageous effect might be compensated by reinforcing the vacuum which prevails inside the compartment. That would bring about a corresponding increase of the suction effect and alter the flow conditions inside the compartment to such a degree that the coating quality would suffer.

Moreover, lighting conditions inside the compartment are not sufficient to allow accurate manual working. For this reason lamps are provided in the known compartment at the location of the manual coating stations to illuminate the workpieces at the locations of the respective manual coating stations, more specifically in the sidewall next to the openings provided for the manual coating stations so that the workpieces are illuminated from the front. In operation these lamps become contaminated very fast by deposits of excess powder.

It is an object of the invention to design a compartment of the kind defined initially such that the escape of powder particles into the environment of the compartment is reduced while unobstructed, high-quality manual coating still can be achieved economically, i.e. especially without increasing the suction effect.

This object is met by claim 1.

With the compartment according to the invention openings in the sidewall of the compartment for manual coating are avoided altogether. Consequently, any exiting of powder through such openings is prevented and with it the disadvantageous consequences described.

Other than in the prior art, the workpieces are pre- and/or re-coated outside of the compartment at a manual coating station which, according to the invention, is located upstream or downstream of the compartment in conveying direction. Thus the person doing the manual coating inherently is offered practically unlimited free space for careful manual coating, as would not be available even with very large lateral openings for manual coating in the state of the art. This is possible without any extra expenditure while, at the same time, achieving superior manual coating quality.

Daylight or the workshop lighting which is installed anyway may be sufficient to illuminate the portions to be coated. In addition, lamps may be mounted at the outside of the compartment for illumination of the coating places. In this manner the unavoidable illumination in the interior of the compartment may be realized in the form of lighting fixtures in the ceiling, in other words at a location which is not sensitive to contamination.

The preferred arrangement of the respective manual coating station near the aperture which always is kept open during operation makes sure that practically none of the powder sprayed when manually coating workpieces gets lost to the environment. The negative pressure inside

the compartment has the effect of any excess powder which does not reach the workpiece being sucked through the aperture into the compartment.

It is advantageous to have a second manual coating station downstream of a second aperture for the workpieces in a second end wall at the downstream end of the compartment if there is need for recoating or revision following the automatic coating inside the compartment. It is likewise conceivable to provide this manual coating station as the only manual coating station.

Further advantageous modifications of the invention are protected by the other subclaims.

The invention will be described further, by way of example, with reference to the accompanying diagrammatic drawings, in which:

Fig. 1 is a top plan view of a compartment according to the invention;

Fig. 2 is a front end view of the compartment shown in fig. 1, as seen in the direction of arrow II in fig. 1;

Fig. 3 is a side elevation of the compartment shown in figs. 1 and 2, as seen in the direction of arrow III in fig. 1;

Fig. 4 is a perspective view of the upstream end of the compartment, including a manual coating station designed and arranged according to the invention;

Fig. 5 illustrate four design examples for the rear wall of a manual coating station according to the invention, each showing a partial section transversely of the conveying direction of the workpieces into the compartment.

The compartment illustrated in the drawings serves for coating of workpieces W, indicated in dash-dot lines, which are moved continuously or in stepwise fashion through the compartment in the direction of the respective arrow along a conveying direction or path T, likewise drawn in dash-dot lines. The compartment has two sidewalls 2 formed with oblong vertical holes 4 to permit passage of vertically movable automatic powder spray guns 6 indicated in fig. 1.

The compartment further comprises a compartment roof 8 divided by a longitudinal gap S which allows suspension devices 10 for the workpieces W to be passed through in order to permit the suspension devices 10 with the workpieces W suspended from them to be conveyed through the compartment along the conveying path T.

The compartment further has a floor 12 and a front end wall 14, both disposed at the left end of the compartment as seen in figs. 1 and 3, and a rear end wall 20 at the right end of the compartment, as seen in figs. 1 and 3. The end wall 14 has an aperture 16 distinctly larger than the transverse profile of the workpieces W (see fig. 2). This aperture 16 can be closed for cleaning operations by a sliding door 18 which permits access to the walkable interior of the compartment.

The rear end wall 20 has an aperture 19 which, just like the aperture 16, may have dimensions that allow passage of the workpieces W to leave the compartment. A door may be missing here, especially if provision is made for suction near the front end wall 14.

A manual coating station, generally indicated by reference numeral 30, is arranged so as to be contiguous with the end wall 14. It comprises a walkable standing floor 34 supported on legs 32 and positioned higher than the floor 12 of the compartment. As it has no wall at the right hand side of the conveying path, as seen in fig. 2, it is freely accessible. At the left hand side in fig. 2 there is a rear wall 36 which is bent in its upper region to form a partial roof cover 38 of the manual coating station, extending parallel to the conveying path T all the way up to the left edge, in fig. 2, of the gap S for passage of the suspension devices 10 for the workpieces W. The partial roof cover may be realized in four different configurations as shown in figs. 5a to 5d. In its upper part 18', on the left hand side in fig. 2, the sliding door 18 is shaped so as to conform to the profile of the partial roof cover 38. As the outline of the sliding door 18 is adapted to that of the rear wall 36 and of the partial roof cover 38 an inserted seal 39 (figs. 5a) to 5d)) will provide optimum cleaning efficiency when the sliding door 18 is closed.

As may be taken from figs. 2, 3, and 4, a suction line 50 extending under the standing floor 34 is connected to an opening 52 formed in the front end wall 14 of the compartment. The suction line 50 is connected to a filtering or recovering unit (not shown) for excess powder.

A second manual coating station 40 is disposed directly adjacent the end wall 20 downstream of the compartment. It comprises a standing floor 44 resting on legs 42 and is accessible from

the opposite side of manual coating station 30, likewise having a rear wall 46 with a bent partial roof cover 48. Instead of communicating through the opening 52 in the front end wall, the suction line 50 also might be connected to the interior of the compartment through an opening below the standing floor 44 in the rear end wall 22. In the example illustrated in fig. 1 the manual coating station 30 has a greater dimension L in conveying direction T than the corresponding dimension l of the manual coating station 40 because the suction effect through the aperture 16 into the compartment is greater near the suction opening 52 than the suction effect through the aperture 19. At this end of the compartment, therefore, the operator can do the coating at a greater distance from the aperture than at the other end of the compartment and consequently has more available free space.

Preferably at least walls 2, 14, and 20 of the compartment and the compartment roof 8 are made of a material which is not electrically conductive.

During operation of the compartment workpieces W are conveyed through the compartment from left to right, as seen in fig. 2, either continuously or stepwise. At the same time that automatic coating takes place in the interior of the compartment by means of the automatic spray guns 6, a person standing or sitting on the standing floor 34 does the precoating of critical places of a workpiece W which still is outside of the compartment. In the same manner another person doing manual coating can perform this work at the manual coating station 40 on workpieces W which are leaving the compartment and have received a faulty or incomplete coating. The workers have practically unlimited free space outside of the interior of the compartment to manipulate their spray guns for manual coating. And it may be possible to illuminate the workpieces at the places to be coated by means of lamps mounted on the outside of the compartment roof.

The suction acting towards the interior of the compartment at the apertures 16 and 19, respectively, in the respective end walls 14, 20 draws excess powder which does not reach the respective workpieces W during manual coating into these apertures.

The features of the invention disclosed in the specification, claims, and drawings may be essential for carrying out the invention, both individually and in any combination.